

Course Code: BC123

Course Name: Mathematics Foundations to Computer Science-I

Day & Date: Tuesday 06/01/2026

Time : 02.15 PM- 05.15 PM

Max Marks: 100

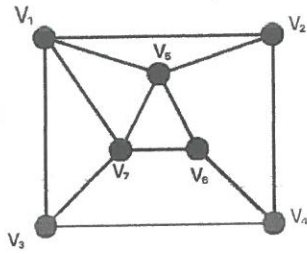
- Instructions:**
- 1) All questions are compulsory.
 - 2) Figures in rounded () brackets within the question, indicate the scheme of marking for respective part of the question, whereas, figures in the first right column indicate total marks for that whole question.
 - 3) CO is the index number of the Course Outcome statement.
 - 4) The Bloom's taxonomy level (BL) for 1,2,3,4,5 and 6 is remember, understand, apply, analyse, evaluate and create respectively.
 - 5) Assume suitable data if necessary.
 - 6) Use of non-programmable calculators is allowed

		Marks	COs	BT Level
Q.1	Attempt the parts (a) (b) and (c) of Question	15		
(a)	What is relation? Explain any four types with example. (5M)	5	CO1	BL1
	OR			
(a)	Find the values of x and y for the following:			
	a) $\left(\frac{x-1}{2}, \frac{2y-1}{3}\right) = \left(1, \frac{2}{3}\right)$.	5	CO1	BL3
	b) $\left(\frac{2x-2}{3}, \frac{2y+1}{3}\right) = (1, 2)$. (5M)			
(b)	Let A = {0,4,2,6,8,10} B = {0,1,2,3,4,5,6} and C = {4,5,6,7,8,9,10}. Then find	5	CO1	BL3
	a) $A \cap B \cap C$ b) $A \cup B \cup C$ c) $(A \cup B) \cap C$ d) $(A \cap B) \cup C$ e) $(A - B) \cap C$ (5M)			
(c)	Draw Venn diagrams of:			
	a) $A \cap B \cap C$ b) $(A \cap B) \cup (B \cap C) \cup (C \cap A)$ c) $(A \cup B \cup C)$ d) $(A \cup B)$ e) $(A \cup B \cup C)$ (5M)	5	CO1	BL2
Q.2	Attempt the parts (a) (b) and (c) of Question	15		
(a)	What is meant by fundamental principle of counting? Explain with a suitable example. (5M)	5	CO2	BL2
	OR			
(a)	Find the solution for the following recurrence relation using characteristic equation: $a_n = 5a_{n-1} - 6a_{n-2}$, $n \geq 3$ with $a_1 = 1$ and $a_2 = 5$. (5M)	5	CO2	BL
(b)	Expand $(2x-3)^6$ using binomial theorem. (5M)	5	CO2	BL2
(c)	Find general and middle terms of $(x+2y)^5$. (5M)	5	CO2	BL2
Q.3	Attempt the parts (a) (b) and (c) of Question	15		
(a)	What is a graph? Explain terminology of graph? (5M)	5	CO3	BL2

- (b) Explain walk, path and cycle with a neat diagram. (5M) 5 CO3 BL2
- (c) Explain subgraph with its types. (5M) 5 CO3 BL2

OR

- (c) Draw subgraph of given graph:



5 CO3 BL2

- a) By deleting vertex V_2 .
b) By deleting vertex V_3 .
c) By deleting edge between V_4 and V_5 .
d) By deleting edge between V_1 and V_2 .
e) By deleting vertex V_4 . (5M)

Q.4 Attempt the parts (a) (b) and (c) of Question 15

- (a) Find the inverse of the following matrix:

$$A = \begin{bmatrix} 4 & 3 & 8 \\ 6 & 2 & 5 \\ 1 & 5 & 9 \end{bmatrix}$$

(5M)

5 CO1 BL2

- (b) Define following types of matrix with examples:

- a) Square matrix (1M)
b) Upper triangular matrix (1M)
c) Diagonal matrix (1M)
d) Null matrix (1M)
e) Lower triangular matrix (1M) (5M)

OR

- (b) Find minors and co-factors for given matrix:

$$A = \begin{bmatrix} 3 & 4 & 5 \\ 2 & -1 & 8 \\ 5 & -1 & 7 \end{bmatrix}$$

(5M)

5 CO1 BL3

- (c) Find eigenvalues and eigenvectors of following matrix:

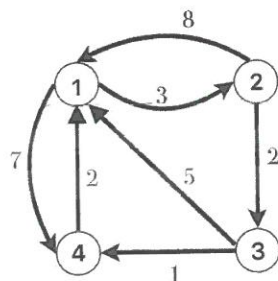
$$A = \begin{bmatrix} 2 & 2 \\ 1 & 3 \end{bmatrix}$$

(5M)

5 CO1 BL1

Q.5 Attempt the parts (a) (b) (c) and (d) of Question 20

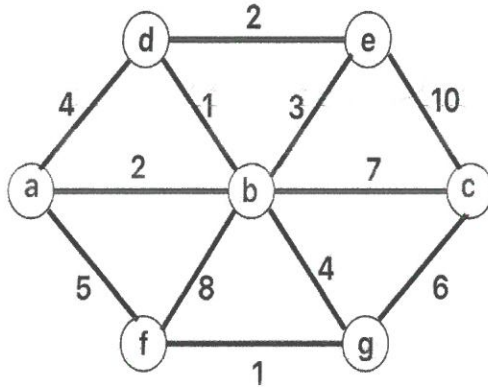
- (a) Write Floyd-Warshall's algorithm for given graph. (5M)



5 CO2 BL2



- (b) Write the applications of graph algorithm in computer science. (5M) 5 CO2 BL2
- (c) Explain the difference between Depth-First Search and Breadth-First Search traversal. (5M) 5 CO2 BL4
- (d) Explain Prim's algorithm for the following graph. (Start from 'a')



(5M)

Q.6 Attempt the parts (a) (b) (c) and (d) of Question

20

- (a) Applications of functions in data base programming and network theory. (5M) 5 CO4 BL2
- (b) Write key applications of permutation and combination. (5M) 5 CO4 BL2
- (c) Write applications of matrix algebra in computer science. (5M) 5 CO4 BL2
- (d) What are the applications of graph theory in social network? (5M) 5 CO4 BL2

